



THE SCIENCE EDUCATION REVIEW

Ideas for enhancing primary and high school science education

Did you Know?

Oil and Water do Mix

Contrary to what is standard knowledge, oil and water do mix. Removing the gas from an oil/water mixture (1 L of water, for example, contains about 20 mL of dissolved gas) allows oil droplets to disperse in the water. Practical applications might include the cleaning of clothes without the need for detergent, the quick and safe delivery of insoluble drugs inside the body, and a revolution in many processes in the food production, perfumery, and drug manufacturing industries. For further information, please visit <http://www.abc.net.au/catalyst/stories/s1314925.htm#transcript>.

Rethinking Unsupervised Summative Assessment

Peter Eastwell

Science Time Education, Warwick, Queensland, Australia
admin@ScienceTime.com.au

Abstract

Unsupervised summative assessment has become a feature of the educational landscape in various educational jurisdictions around the world, including the state of Queensland in Australia. However, I suggest it is an invalid and unnecessary practice that can impact negatively on the affect of students, call for a reconsideration of its use, and point to an improved way forward.

It is now over 30 years since Queensland students last sat, in each subject at the end of both Years 10 and 12, public examinations designed and marked by personnel external to schools. During the ensuing decades, and in conjunction with the implementation of school-based assessment, the types of assessment tasks being used in science education has broadened, and this is to be welcomed. However, it has also become accepted practice for senior (Years 11 and 12) syllabi to provide for unsupervised assessment tasks to be included in summative assessment. In view of especially the high-stakes nature of such summative assessment during the senior years of secondary education (e.g., where Years 11 and 12 assessment is used as the sole selection criterion for some courses of further study), I argue that such a practice is unnecessary, invalid, unfair, and promotes cheating.

Unsupervised assessment makes it easier for students to use dishonest practices to gain better results. For example, they might copy from other sources, collude with peers, get help from a relative, or pay a tutor to complete work for them, and here in Australia, whistle blowers working in tutorial academies and the popular media have been bringing the latter practice to light. Why should students, because of their favourable geographical location or network of contacts, or their financial means, be allowed to gain an advantage over peers by engaging others to do work for them? Such a practice lacks educational equity, deprives students of the feeling of satisfaction that comes from work well done, and probably even impacts negatively on their self-esteem.

Students themselves believe cheating to be a problem (Godfrey & Waugh, n.d.). In a reply to recently sharing my concerns about this issue with an international audience, I received the following from a Bangladeshi student: “I would like to thank you, because I have come to know that this is a problem in other parts of the world, as well as ours. Recently, I was disappointed, as one of my classmates had his assignment done by another meritorious student, while I worked hard to do mine myself” (personal communication, September, 2005).

Appealing to students’ moral code, or code of honour, is insufficient, and students are quick to tell us so (Godfrey & Waugh, n.d.). Common sense suggests the same, yet we find suggestions that procedures such as having students acknowledge all sources of help and keep a record of their progress with a task will somehow suffice. What student is going to tell a teacher that his or her parents paid for a piece of work to be done, or that his or her mother conducted the library research? For me, other practices such as periodic checking on progress by the teacher, student oral presentations (e.g., “Show and Explain”), conversations with a teacher, and a rubric completed by parents or guardians similarly fail to guarantee valid evidence as to student ownership of work. If students cheat, it is because they are allowed to, and this is what is presently happening.

It seems, then, that some fine-tuning of such practices might be desirable, and I think a careful analysis of the alternate policy of summative assessment coming from supervised tasks only is warranted. This is not to say that cooperative and unsupervised tasks do not have a role in education. Indeed, quite the opposite. Both are very highly recommended, as they facilitate even better learning outcomes and the development of important life skills. However, I’m suggesting that they be used for formative (practice) assessment only. I have long resisted the notion that the quality of a group product is also an accurate reflection of the achievement of each student in the group. If, for example, it is deemed appropriate to assess students’ ability to work with others, or to network, then we need to consider how this may be done validly. Interestingly, though, while syllabi promote cooperative learning as a learning strategy, it can at the same time be conspicuous by its absence in the general objectives of the syllabi--from which one might well assume that it is not to be assessed summatively.

The revised policy also wouldn’t mean that summative assessment need be restricted to paper-and-pencil examinations alone. There is scope for performance and other types of authentic assessment, as long as it is supervised. The emphasis should be on deciding exactly what it is we wish to assess summatively and then devising a supervised assessment technique to accomplish it. Allow me to describe a few examples of where such thinking might lead.

It must be some 20 years ago now since I first invited Year 12 Physics students to design and carry out individual, extended experimental investigations. The richness of learning, and the quality of outcomes, from this activity was enhanced by providing the option for students to work, over quite a few months, with a mentor from the community, who was typically a person involved

in a science-based, or science-related, field. However, while the investigations could be designed and carried out in collaboration, and were also eligible for various state and national competitions, most of the assessment associated with this task was formative. I could not justify, for example, marking students summatively for their experimental design, because there was no guarantee that it was their work. Rather, experimental design was taught in class via a consideration of the different types of design weakness--and there are a relatively limited number of them-- and students were assessed using items on a supervised exam that sampled these weaknesses.

Experimental report writing, essays, research reports, and the like, for summative assessment, can also be done in class and supervised. However, the conditions for the task may vary, depending on what is to be achieved by the assessment. If recall of content is also deemed important, students would not be allowed to have notes. If one is assessing their ability to write, though, brief notes may be appropriate. Peter Roberts (personal communication, 2005), of Tullawong State High School, Queensland, Australia, for example, allows limited notes in the form of 15 key words or phrases, with a maximum of six words per phrase. It should not be a concern if students have sought “outside” help on how to write, because the bottom line is that they have learned, and the assessment task is validly reflecting what they have learned. While other processes, such as the ability to summarise information, draw conclusions from data, and present citations and references (or a bibliography) using the required style could also be assessed using supervised, pen-and-paper test items, still other processes, like the ability to locate library resources, would require a different approach.

Until relatively recently, I wouldn't have thought that a teacher would consider sending a set of traditional physics problems, say, home with a student and subsequently marking the responses summatively. So, appreciate how astounded I was to hear a teacher saying that, having marked such responses, she decided she couldn't use them “because the marks were too good”! Not only is this assessment not valid, but it is surely alarming that this teacher apparently didn't even consider that possibility before assigning the task. The “pendulum” appears to have swung too far. Then, there was the other teacher who told me that it doesn't matter how his students produced the work; as long as they did, they were entitled to receive credit for what they had produced. This philosophy is not for me. As an analogy, I have no difficulty with rewarding someone for cooking using a cookbook, but I do have much difficulty with the notion of a chef cooking with, or for, someone who is then credited with the quality of the outcome. When I'm being operated on, I want the confidence that comes from knowing that the certificate the surgeon has been awarded is based on tests that he or she sat himself or herself!

I regularly hear the argument that “if it doesn't ‘count,’ students won't do it,” with it being considered necessary to use the leverage of summative assessment to pressure students to complete tasks. However, I also think this is misguided. Students need to recognize the benefits, to summative assessment results, that can come from practicing tasks and receiving formative feedback--and many students do. However, for any one or more of a variety of reasons, others will choose to forfeit such opportunities. A student may conclude, for example (and rightly or wrongly), that he or she is already sufficiently accomplished in the skills required by a particular assignment and decide to not do it. While teachers can provide learning opportunities, they surely cannot be responsible for all the decisions students might make about how they respond to such opportunities. In particular, and for the reasons being shared in this paper, it certainly seems unsound to implement a policy that uses the invalid summative assessment of unsupervised tasks, and which impacts negatively on all students, in an effort to get greater effort from some.

This concern about the use--or, rather, misuse--of unsupervised, summative assessment may not be such an issue at lower stages of education, where such high stakes are not involved. However, in the interests of consistency, it may be desirable to adopt a similar supervised-summative-assessment-only policy at all stages of education within a jurisdiction. As an added bonus, increased emphasis on supervised summative assessment might also have the welcome associated effect of reducing the excessive mandated academic workloads that students can experience in connection with the adoption of school-based assessment frameworks.

Reference

Godfrey, J., & Waugh, R. (n.d.). *Students' perceptions of cheating in Australian independent schools*. Retrieved October 21, 2005, from <http://edoz.com.au/educationaustralia/archive/features/cheat.html> .

Demonstration

While the activities in this section of *SER* have been designated demonstrations, some might easily be structured as hands-on student learning experiences. Although some sample lesson sequences may be included, the notes provided both here and in the following section are meant to act primarily as stimuli for classroom activities and to provide teachers with background information, so please modify any sample pedagogy as you see fit.

Identify the Number

Needed. Sheet of paper and a biro or pencil.

This activity provides practice in the skill of asking questions, a process that is central to enquiry. Choose a number from 1 to 1,000, secretly write it on a piece of paper, and fold the paper to conceal the number. Invite students to ask yes/no questions (i.e., questions to which you can reply either *yes* or *no*) aimed at identifying the number. Each student in the class is permitted to ask one question only until all students have had a turn.

On the board, record each student's name, the question asked, and the response it received. (With a new class, having students say their names helps all to put names to faces.) When the class is close to identifying the number, invite the students to confer, helping those who are yet to ask a question to come up with more narrowing questions.

When a question identifies the chosen number, display it from the folded sheet and ask the student why he or she did not ask that question earlier. Students will recognize the need to learn from the answers to other questions first--just like scientists do. Record the number of questions needed to identify the number, and then repeat the activity.

Variations might include choosing a number between 1 and 10,000 (a greater challenge), having a student lead the group, having students themselves record the students' names, questions, and responses, and requiring students to identify an object hidden in a box.

Source: Sitzman, D. (2005). Pick-a-number. *Science Scope*, 29(1), 58-59.